CLAIMS

Sub A1 1. An exhaust gas purification apparatus, for an engine having a combustion chamber, comprising an exhaust passage, a particulate filter arranged in the exhaust passage for removing particulates in exhaust gas exhausted from the combustion chamber by oxidation, a device for controlling characteristic of the exhaust gas flowing into the particulate filter, and means for judging if the particulate filter will be deteriorated by heat derived from the oxidation of the particulates, wherein, when the judging means judges that the particulate filter will be deteriorated by heat, the controlling device changes the characteristic of the exhaust gas flowing into the particulate filter to prevent the particulate filter from being deteriorated by heat.

2. An exhaust gas purification apparatus, as set forth in claim 1, wherein the controlling device can control the amount of the exhaust gas flowing into the particulate filter and wherein, when the judging means that the particular filter will be deteriorated by heat, the controlling device performs one of a first control operation to make the amount of the exhaust gas flowing into the particulate filter smaller than a first threshold and a second control operation to make the amount of the exhaust gas flowing into the particulate filter larger than a second threshold which is larger than the first threshold.

3. An exhaust gas purification apparatus, as set forth in claim 2, wherein the apparatus further comprises a bypass mechanism for making at least a part of the exhaust gas bypass the particulate filter, and wherein the controlling device makes the amount of the exhaust gas flowing into the particulate filter smaller than the first threshold by the bypass mechanism making at least a part of the exhaust gas bypass the particulate filter.

4. An exhaust gas purification apparatus, as set

forth in claim 2, wherein the controlling device makes the amount of the exhaust gas flowing into the particulate filter smaller than the first threshold by reducing the amount of the air taken into the combustion chamber, and makes the amount of the exhaust gas flowing into the particulate filter larger than the second threshold by increasing the amount of the air taken into the combustion chamber.

5. An exhaust gas purification apparatus, as set forth in claim 4, wherein the controlling device reduces the amount of the air taken into the combustion chamber by reducing the engine speed, and increases the amount of the air taken into the combustion chamber by increasing the engine speed.

6. An exhaust gas purification apparatus, as set forth in claim 1, wherein the judging means judges that the particulate filter will be deteriorated by heat when the temperature of the particulate filter is higher than a predetermined temperature.

7. An exhaust gas purification apparatus, as set forth in claim 6, wherein the predetermined temperature is a temperature at which the particulate is ignited.

8. An exhaust gas purification apparatus, as set forth in claim 1, wherein the judging means judges that the particulate filter will be deteriorated by heat when the temperature of the particulate filter is higher than a predetermined temperature and the concentration of the oxygen in the exhaust gas is larger than a predetermined concentration.

9. An exhaust gas purification apparatus, as set forth in claim 8, wherein the predetermined temperature is a temperature at which the particulate is ignited.

10. An exhaust gas purification apparatus, as set forth in claim 8, wherein the predetermined concentration is set to become small as the concentration of hydrocarbon in the exhaust gas becomes large when the air-fuel ratio of the exhaust gas is lean, and is set to

become large as the concentration of hydrocarbon in the exhaust gas becomes large when the air-fuel ratio of the exhaust gas is stoichiometric or rich.

11. An exhaust gas purification apparatus, as set forth in claim 8, wherein the predetermined concentration is set to become large as the amount of the air taken into the combustion chamber becomes large.

12. An exhaust gas purification apparatus, as set forth in claim 1, wherein, when the judging means judges that the particulate filter will be deteriorated by heat, before the characteristic of the exhaust gas is changed by the controlling device, the judging means judges if the temperature of the particulate filter will become lower than the predetermined temperature by changing the characteristic of the exhaust gas, and if the concentration of the oxygen in the exhaust gas will become smaller than the predetermined concentration by changing the characteristic of the exhaust gas, and the controlling device changes the characteristic of the exhaust gas to make the temperature of the particulate filter lower than the predetermined temperature when the judging means judges that the temperature of the particulate filter will become lower than the predetermined temperature by changing the characteristic of the exhaust gas, and the controlling device changes the characteristic of the exhaust gas to make the concentration of the oxygen in the exhaust gas smaller than the predetermined concentration when the judging means judges that the concentration of the oxygen in the exhaust gas will become smaller than the predetermined concentration.

13. An exhaust gas purification apparatus, as set forth in claim 12, wherein the controlling device controls the characteristic of the exhaust gas by controlling the engine operating condition.

14. An exhaust gas purification apparatus, as set forth in claim 12, wherein the apparatus further

comprises a bypass mechanism for making at least a part of the exhaust gas bypass the particulate filter, and wherein the controlling device makes at least a part of the exhaust gas bypass the particulate filter by the bypass mechanism when the judging means judges that, by changing the characteristic of the exhaust gas, the temperature of the particulate filter will not become lower than the predetermined temperature, and the concentration of the oxygen in the exhaust gas will not become smaller than the predetermined concentration.

15. An exhaust gas purification apparatus, as set forth in claim 1, wherein the apparatus further comprises a reverse mechanism for reversing the inflowing direction of the exhaust gas flowing into the particulate filter.

16. An exhaust gas purification apparatus, as set forth in claim 1, wherein a precious metal catalyst is carried on the particulate filter.

17. An exhaust gas purification apparatus, as set forth in claim 1, wherein an active oxygen release agent which absorbs oxygen and holds the oxygen when excess oxygen is present in the surroundings and releases the held oxygen in the form of active oxygen when the concentration of oxygen in the surroundings falls is carried on the particulate filter and wherein active oxygen is released from the active oxygen release agent and the particulates adhering on the particulate filter are oxidized by the released active oxygen when the particulates adhere on the particulate filter.

18. An exhaust gas purification apparatus, as set forth in claim 17, wherein the active oxygen release agent is comprised of at least one of an alkali metal, an alkali earth metal, a rare earth, a transition metal, and a carbon family element.

19. An exhaust gas purification apparatus, as set forth in claim 18, wherein the alkali metal and alkali earth metal are comprised of metals higher in tendency toward ionization than calcium.

20. An exhaust gas purification apparatus, as set forth in claim 1, wherein the particulates adhering on the particulate filter are oxidized by temporarily making the air-fuel ratio of a part or whole of the exhaust gas rich.

21. An exhaust gas purification apparatus, as set forth in claim 1, wherein a NO_x absorbent for absorbing the NO_x in the exhaust gas when excess oxygen is present in the surroundings and releases the absorbed NO_x when the concentration of oxygen in the surroundings falls is carried on the particulate filter and wherein the characteristic of the exhaust gas flowing into the particulate filter is returned to the original characteristic when a predetermined period has elapsed from when the controlling device changes the characteristic of the exhaust gas, and sulfur adhering on the particulate filter is disassociated from the particulate filter by making the air-fuel ratio of a part or the whole of the exhaust gas rich.